ASSISTANCE TO THE EAPP/IRB

INTERCONNECTION CODE COMPLIANCE PROGRAM

Stage 1: Operations

January 29, 2016

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1. Overview

The Eastern Africa Power Pool (EAPP) member countries continue to plan and build transmission interconnections that will eventually link the electric grids of all member nations and greatly improve the potential for cross border trade, thereby leading to greater energy security and economic prosperity. One of the key components required for the successful integration of the East African region's electricity sector is a framework and set of rules for the coordinated planning and operation of the region's electric transmission systems and generation resources. As a first step, the EAPP and its members directed the development of the EAPP Interconnection Code which was developed in 2012. The Code sets out the technical rules necessary for the EAPP to ensure the transmission grid is operated in a safe, reliable, secure and efficient manner. In 2012, Power Africa then augmented the EAPP Interconnection Code to include a set of standards and measures to clearly specify what was required of member countries/utilities and what evidence was needed to determine whether an entity is in compliance with the each of the requirements set out in the Code.

To further enhance understanding of the Interconnection Code, its standard requirements and measures, and assist member nations in complying with the Code on a timely basis, the EAPP and the Independent Regulatory Board (IRB), with support from Power Africa plan to implement an Interconnection Code Compliance Program as described in this document.

2. Program Approval

An overview of the EAPP Interconnection Code Compliance Program was presented to the EAPP General Secretariat and Steering Committee on January 21, 2016. The presentation described the program design, description and self-assessment process that members will use to determine their standing with the IC requirements. At that meeting, the Steering Committee approved the implementation of Interconnection Code Compliance Program. The following day, January 22, 2016, the Council of Ministers also approved the implementation of the IC Compliance Program.

3. Objectives

The objectives of the EAPP Interconnection Code Compliance Program are:

- To make the standard requirements of the Interconnection Code mandatory to ensure the operational security, reliability of the transmission system and quality of the supply;
- To define a plan to phase in the minimum set of Interconnection Code Standards that are to be met over time[1];
- To assist members to determine if they are in compliance and if not what steps are needed to become compliant;
- To assist the Independent Regulatory Board (IRB) in developing a process which assures that all EAPP Members comply with the Interconnection Code on an ongoing basis; and

[1] Note, the compliance program will accommodate entities that choose to address the Interconnection Standards more quickly than set out as the minimum in this Compliance Program description.

- To assist Members to identify areas where external funding will be needed to meet the Interconnection Code requirements and to assist in obtaining such funding;

4. Program Design

The steps to implement the EAPP Interconnection Code (IC) Compliance Program are described below. The initial focus of the program, referred to as Stage 1[2], will be on the portions of the Interconnection Code that have the greatest potential to impact the reliability of the EAPP transmission grid in the near term and the standard requirements that impact day to day operations planning and the operation of the power system. This will include, at a minimum, some requirements in the following codes:

- Operations Code
- System Operators Training Code
- Interchange Scheduling & Balancing Code
- Connections Code
- General Conditions

4.1. Steps to Implement the Compliance Program

The EAPP/IRB with the support of Power Africa will take the following steps to implement the EAPP Interconnection Code Compliance Program. **Note:** Steps 1-6 have been completed.

Step	Description of Task
1.	Define the specific scope of the program (which standards and functions will be included and for what purpose) and its duration
2.	Define the phasing of the program
3.	Define the standards that will be included in each phase of the program
4.	Define the Self-Assessment process and its requirements
5.	Establish a schedule for all utilities to complete their Self-Assessments for the initial phase of the Interconnection Code Compliance Program
6.	Seek and obtain approval of Program Design (Steps 1 - 5) from the Steering Committee and the Council of Ministers. This would include the phasing of standards the over a period of time and the mandatory nature of the Code.
7.	Confirm which entities are Transmission System Operators (TSOs) and Users as defined by the Interconnection Code.
8.	Develop a Communication Plan for the IRB to notify Utilities, TSOs and Users of the Transmission System of the planned rollout and implementation of the EAPP Interconnection Code Standards and requirements.
9.	In an effort to assist EAPP Members to comply with the Interconnection Code (IC) Standards and Stage 1 requirements, Power Africa through its implementing partner Nexant will

[2] A Stage 2 program is contemplated which will address compliance of standards related to transmission expansion planning.

9. (cont.)	provide the following tools and associated documentation: ▪ An updated Interconnection Code (IC) Gap Analysis tool for use for the Stage 1 compliance program. This upgraded Interconnection Code (IC) Gap Analysis tool will add a feature to document and manage the development of mitigation plans for any gaps that are identified in the self-assessment process. ▪ An updated User Manual for the IC Gap Analysis tool to describe how to use the tool for the Stage 1 compliance program and how to capture and document mitigation plans using the new features of the compliance tool. ▪ A new Tutorial which will include a gap analysis exercise for EAPP members that will provide self-assessment examples that can be used to help train personnel assigned to conduct self-assessments. These exercises will be available via the web. Questions related to the exercises can be submitted to Nexant experts who will review and provide feedback. ▪ A new internet based forum for EAPP utilities that have questions regarding the Interconnection Code Standards and the Self-Assessment process. This will provide a mechanism for utilities to ask questions seeking clarifications on the provisions of the Interconnection Code and the self-assessment process. ▪ A list of Frequently Asked Questions related to the Stage 1 IC Compliance Program. Note: For all tools that are to be accessible via the EAP web, it is assumed that EAPP will implement the necessary website linkages.
10.	Each EAPP utility member will conduct an initial Self-Assessment of their current standing with the IC Standards and requirements as approved by the CoM in Step 6.
11.	Each utility member will submit their Self-Assessments to the IRB for review by the CoM approved scheduled date/deadline.
12.	EAPP/IRB with Power Africa support will review and comment on each of the Self-Assessments as they are completed. A short report summarizing the results will be provided to the entity that submitted the Self-Assessment
13.	Entities that receive a report and comments on their Self-Assessment will have the opportunity to revise their assessment and resubmit it to the EAPP/IRB
14.	Power Africa will develop with the EAPP/IRB an On-site Assessment process and schedule which will involve an expert-led assessment team that will review and make certain a member's self-assessment is accurate and complete based upon observing steps taken to reach compliance.
15.	Power Africa through its implementing partner Nexant will conduct the first Expert-led On-site Assessment at a selected utility as a pilot of this process.
16.	Nexant and the EAPP/IRB will then review the results of the first utility's Self-Assessment and expert-led On-Site Assessment and make any adjustments necessary to improve the program design and process.
17.	Nexant and the EAPP/IRB will continue with the Expert-led Review of the Self-Assessments submitted by all utilities over an approximately two calendar years. Note that it is expected that the first three countries will be Ethiopia, Kenya and Tanzania. Current budgets have been approved for these three countries. Costs to complete the remaining countries will be submitted in future budgets.

18.	Following the first phase of the On-site Assessments, Nexant will assist the EAPP/IRB in designing an Interconnection Code Monitoring and Reporting process and schedule.
19.	The EAPP/IRB will then seek comments from Member Utilities and obtain approval of the Interconnection Code Monitoring and Reporting process from the Council of Ministers
20.	The EAPP/IRB with support from Nexant will issue Phase 1 Self-Assessment/On-Site Assessment Report laying out the deficiencies and needs of the respective Member Utilities.
21.	Power Africa will capture and report on other recommended longer term steps related to the implementation of the EAPP Interconnection Code, standards and measures that were identified during the review process.

4.2. Communication to Stakeholders

In conjunction with EAPP/IRB, Power Africa through its implementing partner Nexant will develop a Communication Plan to notify Utilities, Transmission System Operators (TSO) and Users of the Transmission System of the planned rollout and implementation of the EAPP Interconnection Code Standards and requirements.

4.3. Program Requirements

The following section provides a summary of the requirements of the EAPP members. These requirements are not an exhaustive list but are shown to reflect the primary responsibilities of a member utility.

4.3.1. Identification of Utilities, TSO's and Users

All EAPP member Utilities' Transmission System Operators and Users of the EAPP Transmission System will be identified by the EAPP/IRB. The EAPP Members will need to confirm that they perform these functions and to provide official contact information for each organization's key representative.

This list will consist of all of the EAPP electric transmission system owners, operators and users of the transmission system who are responsible for performing specified reliability functions spelled out in the EAPP Interconnection Code to which requirements of mandatory EAPP Interconnection Code standards are applicable.

4.3.2. Adherence with Requirements

All EAPP member utilities shall comply with all applicable Interconnection Code requirements or have a mitigation plan showing how it will become compliant, as updated via the EAPP/IRB from time to time. It is planned to phase in the Interconnection Code Standards over time.

4.3.3. Self-Assessment

All EAPP Member Utilities shall conduct a thorough Self-Assessment of its current standing with respect to its compliance with the appropriate Interconnection Code requirements. This will identify any gaps between a member's current state and full compliance with the

Interconnection code standard requirements. A detailed description of the Self-Assessment process can be found in Section 6 of this document.

4.3.4. Gap Analysis and Mitigation Action Plans

Each Utility will develop a Gap Analysis and Mitigation Action Plan to identify gaps and address any gaps/deficiencies found during the Self-Assessment. The Mitigation Action Plan shall include a description of the tasks necessary to correct the deficiencies, including a milestone schedule that defines when the Mitigation Action Plan will be successfully completed and compliance attained.

4.3.5. Gap Analysis and Mitigation Action Plan Updates

The EAPP/IRB will develop a Mitigation Action Plan Monitoring and Reporting process to monitor the utility's progress and the ultimate completion of the Mitigation Action Plans. Each utility will provide the EAPP/IRB with regular updates on the status of the Mitigation Action Plans and their progress to complete Action Plans.

4.3.6. Participate on the Interconnection Code Review Panel

EAPP members shall actively participate in the Interconnection Code Review Panel and other sub-committees that may be formed to address necessary revisions to the Code's requirements. Each member may designate a qualified representative for a set term to be determined by the member (recommended at least 2 years).

4.4. Implementation Timeline

It is anticipated that the implementation of the Interconnection Code will commence during the first quarter of 2016 and extend for a 3 year period through 2018. The EAPP/IRB will develop the plan for a phased implementation of the EAPP Interconnection Code based on the plan to initially adopt those Interconnection Code standard requirements that will address the highest risks to the regional transmission system.

Note: Approved PATRP budgets cover the cost of roughly the first year of the program. Future budgets will need to cover the second two years.

It is anticipated that the Interconnection Code Stage 1 program which is related to operation will be implemented in three (3) phases, with specific elements of the Operations Code, System Operators Training Code and Interchange Scheduling & Balancing Code being in the initial three phases due to their potential significant impact on the operation of the transmission system. The timing of the three phase program is the minimum that should be met; however, entities are encouraged to complete the three phases in a short a time as possible.

Other operations related compliance requirements and other code areas, such as transmission expansion planning will also likely be addressed. However, these will be identified and addressed in subsequent compliance programs (e.g. Stage 2 Compliance Program – Planning).

5. Program Description

This section describes the overall design of the Stage 1 – Operations Compliance Program.

5.1. Phasing of Implementation; Stage 1- Operations

This section describes the scope and phasing of Stage 1 of the Compliance Program to implement the IC Standards and assess member's compliance with the requirements. The Stage 1 plan places a strong emphasis on steps to ensure compliance with the operating standards that pose the highest near term risk to the reliability of the EAPP regional transmission system. Stage 1 also includes critical IC Standards that may require equipment and/or technology capital investments and long lead time mitigation efforts to comply with the EAPP IC requirements.

A coordinated multi-year three phased approach for Stage 1 is proposed to ensure EAPP members adequate time to manage the workload, training and organizational changes that is inherent with implementing new standards and work practices. However as described earlier, members are encouraged, if possible, to complete the three phases in less time than is prescribed in the program to ensure that compliance is reached as early as possible and to determine early what external funding may be required for all three phases of the program. The program will accommodate members who choose to complete their assessments ahead of the prescribed program.

Note that this Program also is envisioned to include a future Stage 2 that will address compliance with the planning related IC Standards. That second stage of the program will build on the lessons learned from this Stage I Program and is subject to approval of EAPP and future PATRP budgets.

5.2. Stage 1 - Operations

Overall, there are 436 EAPP Interconnection Code Standards that are grouped into eight Code Sections (see Table 1 below). The Stage 1 Compliance Program, which focuses on operation of the EAPP interconnected systems, includes IC standards which fall into five of those eight Code Sections. Within those five IC Code Sections, 268 of the standards have been included in the Stage 1 Program because they have the highest potential risk of impacting the reliable operation of the transmission grid in the near term. These 268 Codes will be the focus during the three-phase Stage 1 Compliance Program. At this time we are anticipating that the each phase of the three phase program would be one year in duration. If, circumstances suggest that less time should be taken then these durations can be shortened.

This focused approach will provide entities with a clear understanding of the IC standard requirements and an opportunity to communicate and educate their operating staffs on those requirements.

5.3. Phasing of Stage 1 Compliance Program

There are three phases proposed to implement the IC Standards included in the Stage 1 Compliance Program. This approach is suggested to allow EAPP members that are participating in this initial rollout to manage and communicate the requirements, assess their compliance with the

requirements and implement what may be substantial effort to mitigate any gaps found during the assessments in order to meet the IC Standard requirements.

The phasing of the Stage 1 Compliance Program used the following approach[3]:

- **Phase 1:** Implement those IC standards that are essential to reliably operate the interconnected EAPP transmission grid. Also included in Phase 1 are those standards that may require capital investments in long lead time power system equipment or technology solutions in order to comply with the EAPP IC Standard requirements. By including these standards in Phase 1, it maximizes the time available to identify gaps, develop solutions and implement those solutions.
- **Phase 2:** Implement the IC standards essential to operating the transmission grid and generation resources reliably, especially those standards that require procedural, work practice, process changes and training to comply with the standard requirements.
- **Phase 3:** All other important IC Standards necessary to operate a safe and reliable interconnected transmission system.

5.4. Code Sections Included in the Stage 1 Compliance Program

The IC Standards are contained in eight Code Sections. Table 1 lists the sections and the number of requirements in each section. Since the initial focus of this program is on the portions of the Interconnection Code that have the greatest potential to impact the reliability of the EAPP interconnected transmission grid and the day to day operation of the power system, only the critical IC Standards in five of the eight code sections are included in the Stage 1 scope of the Compliance Program, as also shown in Table 1.

Table 1: Stage 1 Code Sections and Standards

Code Section Title	Code Acronym	Total Standards	Stage 1 Standards	Stage 1, Phase 1 Standards
Operations Code	OC	157	137	32
Connections Code	CC	78	75	12
Interchange Scheduling & Balancing	ISBC	36	33	20
System Operator Training Code	SOTC	23	21	3
General Conditions	GC	35	2	2
Metering Code	MC	39	0	0
Planning Code	PC	33	0	0
Data Exchange Code	DEC	35	0	0
Total		436	268	69

[3] Note: the phasing of standards is based upon the assumption that major interconnections between countries are forecasted to be in operation sometime in 2018 at the earliest. Thus the phasing of the Compliance Program provides for at least two full years to address the standards in Phases 1 and 2 and part of a third year to address Phase 3 before major interconnections will be operational.

6. Self-Assessment Process

The focus of this section is to describe the process that the EAPP will use to implement the Interconnection Code (IC) Compliance Program's Self-Assessment Process that will be utilized by the EAPP, EAPP Responsible Parties and third party subject experts to complete the initial self-assessments of compliance with the requirements and the mitigation plans needed to address the gaps identified during the self-assessments.

This Self-Assessment process has been developed based upon the experience of conducting similar self-assessments of compliance with grid standards in other regions of the world.

6.1. Responsible Parties

In the EAPP IC Compliance Program, a Responsible Party refers to an entity that has responsibility for complying with all or part of a given standard. All parties that have a role in achieving compliance with the standards are included in the definition of Responsible Party. Responsible Parties include the IRB, Transmission System Operators (includes transmission owners and system operators), Generators, Distribution Users (distribution companies) and the EAPP.

6.2. Key Elements

There are a number of key elements included in the Self-Assessment Process that will assist all parties in completing an effective Self-Assessment and achieve compliance with the IC standards as highlighted below;

- Tutorials and Tools: Nexant will develop and provide tutorials and tools to the EAPP/IRB to post on the EAPP website or otherwise distribute to assist Responsible Parties to understand the Self-Assessment process;
- Self-Assessment Process: Responsible Parties are to conduct their initial Self-Assessments of compliance with the "EAPP Interconnection Code Compliance Program - Stage 1[4]" document. This will include an assessment and the development of a mitigation plan for the standards included in Stage 1 of the Compliance Program;
- Mitigation Plan Development & Implementation: Develop Mitigation Plans to address any gaps in compliance with the IC Standard requirements identified during the self-assessments and expert-lead team reviews; and
- Expert-Led Team Reviews: Conduct on-site reviews by an expert-led team of the Responsible Party's self-assessment and mitigation plans. Expert-led teams will be made up of Nexant team leader that has previous experience with system operations and compliance with standards, other support personnel, IRB and/or EAPP personnel and possibly other potential members as a capacity building activity. These Expert-led teams will use the site visits to review and observe steps that have been taken to meet requirements to verify that they are complete and effective.

[4] Stage 1 of the Compliance Program applies to operating related standards while Stage 2 will address planning standards.

6.3. Self-Assessment Process

Diagram 1 provides a high level view of the primary tasks and workflow for the Self-Assessment Process.

Diagram 1 – Self-Assessment Process

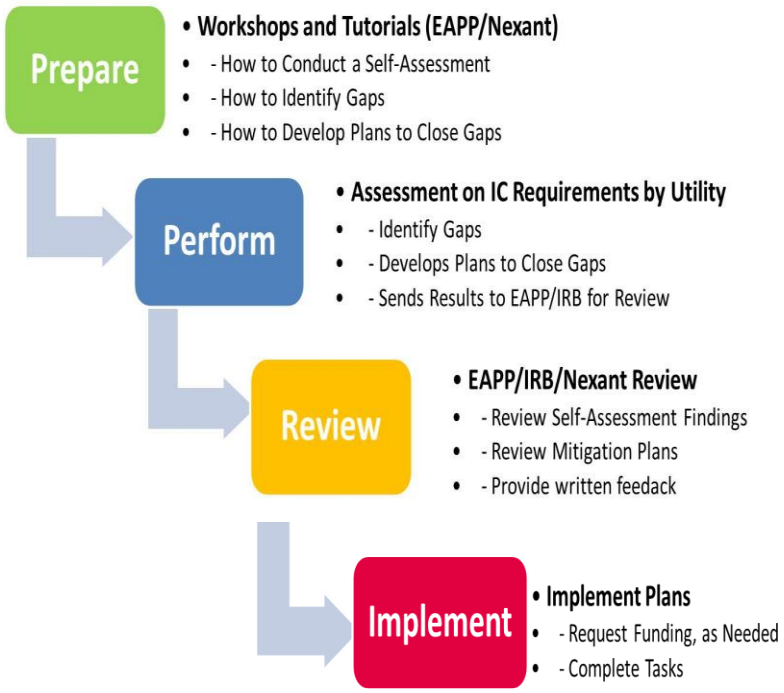


Table 1 describes the tasks and responsibilities in the self-assessment process.

Table 1- Summary of Process Steps and Responsibilities

Step	Process Step	Description of Process Step	Responsibility
1	Tutorials and Tools Made Available	Nexant will develop and provide tutorials and other tools that will be posted on the EAPP website or otherwise provided to assist Responsible Parties to understand the Self-Assessment process.	Developed by Nexant
2	Notification to Responsible Party of Self-Assessment	The EAPP/IRB Secretariat will provide a written notice to the Responsible Party that describes the standards included in the Self-Assessment and a schedule that	EAPP/IRB Secretariat with Nexant

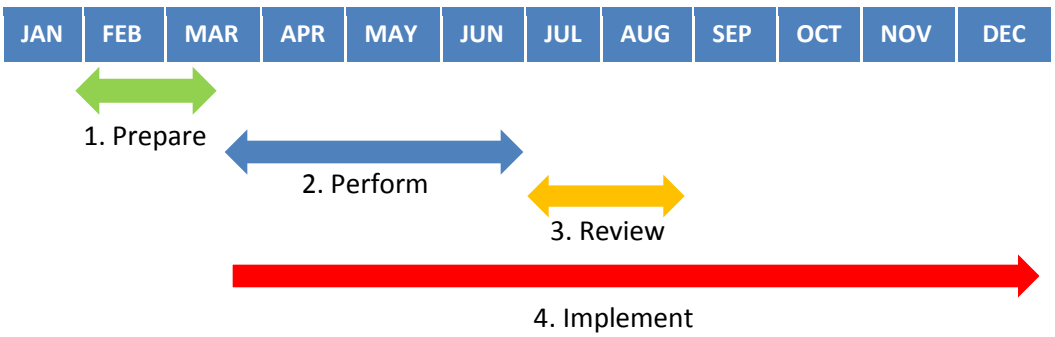
Step	Process Step	Description of Process Step	Responsibility
	Requirements	describes the various steps in the process and when these tasks are scheduled to be completed.	support.
3	Responsible Party Conducts Self-Assessment and Mitigation Plan Development	Responsible Party conducts their initial Self -Assessments of compliance with the EAPP Interconnection Code Compliance Program - Stage 1 Standards. This includes thoroughly reviewing and understanding the standard requirements, evaluating the current state of compliance, providing evidence that it is being met, or describing why they are non-compliant and developing a mitigation plan to address any of the gaps identified in the self-assessment.	Responsible Party
4	Responsible Party Submits Self-Assessment Findings and Mitigation Plans to EAPP/IRB	Once the Responsible Party completes the assessment of its' current state of compliance with all of the IC Program - Stage 1 Standards and prepares Mitigation plans for any non-compliant items found, they submit the findings and mitigation plans to the IRB on or before the due date listed in the notice (see Step 2) received from the IRB.	Responsible Party
5	EAPP/IRB Review of Self-Assessment Findings and Mitigation Plans	The IRB, with assistance from Nexant, will review the findings and mitigation plans submitted by the responsible party to assure there are no gaps in the process used or the information provided and develops comments on the material provided.	IRB with Nexant support
6	IRB Provides Comments to Responsible Party on Self- Assessment and Mitigation Plan Review	The IRB, with the assistance of Nexant, will send a written response to the responsible party on the results of their review of their submitted self-assessment and mitigation plans. This may include a list of questions and requests that additional information be included in the revised assessment.	IRB with Nexant support
7	Responsible Party Revises Self-Assessment and Mitigation Plan.	After reviewing the comments, the Responsible Party revises the Self-Assessment and Mitigation Plans as appropriate and sends revisions to the IRB.	Responsible Party
The following five steps, 8-13, are related to performing an Expert-led Onsite Review. These will be scheduled over a two year period starting in the summer/fall of 2016.			
Step	Process Step	Description of Process Step	Responsibility
8	IRB Schedules Onsite Visit with Responsible Party	The IRB and representative from the Expert-led Review Team work with the Responsible Party to schedule a 1-week visit to their site to work with the Responsible Party's Self-Assessment team. Date to be agreed to and confirmed in writing by the IRB.	IRB and Nexant
9	IRB Submits Onsite Review Information Request to the Responsible Party	The IRB will provide a list of questions, if any, requesting clarifications of the self-assessment and additional information that it might need prior to the on-site review. This information to be provided to the IRB and Nexant prior to the start of the 1-week onsite visit by the Nexant	IRB with Nexant support

Step	Process Step	Description of Process Step	Responsibility
		Expert-led Review Team.	
10	Responsible Party Provides Information Requested to IRB	The Responsible Party submits the responses to the questions, clarifications and possible additional supporting evidence of compliance to the IRB by the due date stated in the onsite request notice.	Responsible Party
11	Expert-led Team Performs Onsite Review of Self-Assessment Results	The Review Team will arrive at the Responsible Party's designated onsite location to work with their team on the items found during the Self-Assessment/Mitigation Plan review plus any other follow-up items identified.	Nexant Expert-Led Review Team
12	IRB/Review Team Provides Onsite Findings Report	Following the onsite visit, the Expert-led Review Team will prepare a report on the findings and results of the on-site review. The IRB will prepare a letter describing the results of that onsite visit.	IRB with Nexant support
13	Responsible Party Revises Self-Assessment and Mitigation Plan	After reviewing the Onsite Findings Report, the Responsible Party will revise their Self-Assessments and Mitigation Plans to address the items in the report as appropriate. The Responsible Party will provide the Final Self-Assessments and Mitigation Plans to the IRB by the due date listed in the Onsite Findings Report.	Responsible Party
14	Responsible Party Implements Mitigation Plans	The Responsible Party begins the implementation of the corrective actions described in the approved Mitigation Plans by the due dates listed in the plans.	Responsible Party

6.4 Self-Assessment Schedule

The high level milestone schedule shown in Diagram 2 has been developed to estimate the process steps, work flow and schedule for major tasks included in the Self-Assessment process. Stage 1; Phase 1 is expected to be completed by the end of 2016 by all members. The Self-Assessment process, including the development of Mitigation Plans, shall be completed by the end of 2016.

Diagram 2 – Typical Self-Assessment Milestone Schedule for Phase 1



Note: Implementation of Mitigation Plans should begin as soon as possible by the utility if areas of non-compliance are found during the self-assessments.

6.4. Self-Assessment Useful Tools

This program will provide several valuable tools to assist the EAPP member companies to implement the Compliance Program, such as:

- An internet accessible tutorial for the Phase 1 Interconnection Code requirements
- A template and associated examples for the self-assessment process
- Support of Power Africa experts via the internet for self-assessment related questions
- On-site review of self-assessments led by Power Africa experts (planned to be conducted over two years)
- Support by Power Africa experts to assist EAPP member utilities in seeking external funding for Mitigation Plans

6.5. Onsite Reviews by Expert-Led Team

The plan is to have an expert-led team conduct an onsite review of each of the Responsible Party's self-assessment and mitigation plan findings. Expert-led teams will be made up of a Nexant team leader that has previous experience with system operations and compliance with standards, other support personnel, IRB and/or EAPP personnel and possibly other potential members as a capacity building activity. These Expert-led teams will use the site visits to review and observe steps that have been taken to meet requirements to verify that the processes used are complete and effective.

6.5.1. Schedule

The planned schedule for the Expert-Led team to conduct their Stage 1 onsite visits is to begin by the 3rd quarter of 2016 and complete the first three utilities review for Stage 1 by the end of the year 2016.